NON-PUBLIC?: N
ACCESSION #: 9511210125
LICENSEE EVENT REPORT (LER)

FACILITY NAME: TURKEY POINT UNIT 3 PAGE: 1 OF 7

DOCKET NUMBER: 05000250

TITLE: Manual Reactor Trip Following Drop of Four Control Rods
EVENT DATE: 10/17/95 LER #: 95-007-00 REPORT DATE: 11/09/95

OTHER FACILITIES INVOLVED: DOCKET NO: 05000

OPERATING MODE: 1 POWER LEVEL: 100

THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR SECTION:
10 CFR 50.73 (a) (2) (iv)

LICENSEE CONTACT FOR THIS LER:
NAME: J. E. Knorr, Regulation and TELEPHONE: (305) 246-6757
Compliance Specialist

COMPONENT FAILURE DESCRIPTION:
CAUSE: SYSTEM: COMPONENT: MANUFACTURER:
REPORTABLE NPRDS:

SUPPLEMENTAL REPORT EXPECTED: NO

ABSTRACT:

On October 17, 1995, Florida Power & Light Company's Turkey Point Unit 3 was operating in Mode 1 at 100% power.

At 0449 hours a Rod Control Urgent Failure alarm was received along with indication of 4 dropped control rods. The reactor was manually tripped twenty-two seconds later. Off Normal Operating Procedure 3-ONOP-028.3, "Dropped RCC," requires the reactor to be tripped if more than two control rods drop into the core.

The cause of the dropped rods was water intrusion into rod control power cabinet 2BD. The design of the drain in an air conditioner evaporator drip pan was found to be inadequate for the level of humidity in the cable spreading room.

The NRC operations center was notified at 0553 in accordance with 10 CFR

Section 50.72(b)(2)(ii), Reactor Protection System Actuation.

END OF ABSTRACT

I. DESCRIPTION OF THE EVENT

On October 17, 1995, Florida Power & Light Company's (FPL) Turkey Point Unit 3 was operating in Mode 1 at 100% power.

At 0449 hours a Rod Control Urgent Failure alarm AA:JA! was received along with indication of 4 dropped control rods AA:ROD!. The reactor was manually tripped twenty-two seconds later. Off Normal Operating Procedure 3-ONOP-028.3, "Dropped RCC," requires the reactor to be tripped if more than two control rods drop into the core.

The NRC operations center was notified at 0553 in accordance with 10 CFR Section 50.72(b)(2)(ii), Reactor Protection System Actuation.

II. SYSTEM DESCRIPTION

Group 2 of Control Bank B (4 of 8 rods in Control Bank B) dropped into the core, which by procedure requires a manual trip. Control Bank B control circuit cards AA:LCO! are contained in control power cabinet 2BD AA:CAB! in the 3B motor control center (MCC) room on the 18 ft. elevation. Control power cabinet 2BD contains the control cards for the stationary coils AA:CL! for Control Banks B and D and the control cards for the movable coils of Control Banks B and D. Other cards are also present in this control power cabinet but were not affected by the water intrusion. The stationary coil cards are specific to groups. The movable coil cards are multiplexed such that more than one group is controlled by each card. Immediately above the 2BD control power cabinet is the cable spreading room floor. Both the cable spreading room and the Unit 3 MCC are air conditioned. The drain pan for the evaporator coil for the cable spreading room air conditioning unit is immediately below the air conditioning unit with a drain running to a nearby standpipe.

III. CAUSE OF THE EVENT

Root Cause:

The root cause of the rod drop was a very small amount of water dropping onto the control cards which fed the stationary coils for the group 2 rods of Control Bank B. Due to the water on the stationary coil card, the 4 group 2 rods for Control Bank B dropped.

Contributing Causes:

On October 16, 1995, at 16:29 an inadvertent automatic fire suppression system (Halon) KQ:! actuation occurred in the cable spreading room. This occurred while restoring the Halon system after testing of the fire detection system IC:! in an area near the cable spreading room. After the actuation, the vendor was called to aid in the determination of the cause of the actuation. After extensive investigation by FPL and vendor personnel the cause is believed to be a voltage spike during system restoration. The spike could not be duplicated. The vendor also

determined as part of the investigation that the second of two Halon bottles KQ:! had not discharged and could possibly discharge at any time. As a result of the potential for the second bottle to discharge, Turkey Point personnel restricted access to the cable spreading room and left the doors open for ventilation of the room. The increased humidity in the room due to the open doors was condensed into a drain pan VI:DRN! under the cooling coils of the air conditioning unit (VI:AHU! in the north west corner of the cable spreading room. The drip pan drain is sized for humidity levels with the door closed. With the door open, humidity levels rose causing condensed water to overflow onto the floor of the cable spreading room. Unknown to plant personnel, the water began to puddle on the cable spreading room floor and flowed to an area with support base plates held down with concrete anchor bolts. Due to the depth of the anchor bolt hole, water from the cable spreading room migrated through a bottom patched anchor hole and dripped onto the top of control power cabinet 2BD in the MCC below. Some of the water collected on top of the 2BD control power cabinet and dripped onto the control cards within the cabinet, resulting in the dropped control rods.

Additional investigation of the reason for the discharge of only one of two Halon bottles during the inadvertent actuation of the automatic suppression system, resulted in discovery of a check valve installed backwards. This check valve had been installed during the original installation of the Halon automatic discharge system in 1986. The remaining check valves installed on the primary and backup Halon bottles were visually inspected and found to be installed correctly. The incorrectly installed check valve has been corrected and verified.

IV. ANALYSIS OF THE EVENT

Safety Analysis for Rod Drop

Rod Cluster Control Assembly (RCCA) Drop is a UFSAR analyzed accident. The dropped rod event is a Condition II event that is assumed to be initiated by a single electrical or mechanical failure which causes any number and combination of rods from the same group of a given bank to fall to the bottom of the core. The resulting negative reactivity insertion causes nuclear power to decrease rapidly. An increase in the hot channel factor may occur due to the skewed power distribution representative of a dropped rod configuration. In this case the rod drop was symmetrical. Since this is a Condition II event, the analysis must show that the departure from nucleate boiling design basis is met for the combination of power, hot channel factor, and other system conditions which exist following the dropped rod.

Conclusion

The analysis for the Unit 3 Cycle 15 core design, assuming no turbine runback verified that the departure from nucleate boiling ratio remains above the limit value for both the standard and optimized fuel designs which are present in the core.

Analysis for Halon Automatic Suppression System Degradation

The alternate shutdown panel and associated procedures which would be used to shutdown the plant after a fire in the cable spreading room or control room do not take credit for any cabling within the cable spreading room. The suppression system is present in the cable spreading room due to a requirement of 10 CFR 50 Appendix R. Therefore, alternate shutdown capability is still operable with a fire in the cable spreading room.

The Halon automatic suppression system for the cable spreading room consists of two 433 pound bottles of Halon with a manual transfer switch to two identical reserve bottles.

Due to the reverse orientation of a check valve on one of the primary Halon bottles, an analysis of the remaining capability of the single main Halon bottle for the cable spreading room has been performed. The 433 pounds of Halon available would have resulted in a Halon concentration of 3.3% in the cable spreading room for 30 minute s. While National Fire Protection Association (NFPA) 12A recommends a minimum design for flame extinguishment of 5%, actual cup burner tests on flammable liquids demonstrate flame extinguishment at concentrations between 3 and 4%. Flame extinguishment is provided by concentrations less than 3.3% for acetone, benzene, and methane.

In the event that a fire occurred, alarms in the control room would cause an investigation by operations. Upon confirmation by an operator that a fire is present, the fire brigade would be mobilized. The smoke detection system is such that a single detector would be expected to alarm, resulting in operator investigation, prior to two alarms being received which would result in Halon actuation. Review of Off Normal Operating Procedure O-ONOP-16.8, "Response to a Fire/Smoke Detection System Alarm," indicates that if an alarm was received from the cable spreading room, the Halon system would be checked for actuation. Notes in the ONOP indicate that the alarm should be cleared at the local alarm panel prior to transferring automatic Halon operation to the reserve bank to avoid inadvertent actuation. The actions specified in O-ONOP-016.8 are expected to be performed by the operator on the scene prior to the arrival of the fire brigade. The fire brigade would be involved in reviewing the situation and assessing appropriate pre-established fire fighting strategies. If deemed appropriate, the fire brigade leader is provided with the option, as part of his training, of actuating the reserve Halon bank for the cable spreading room. The actuation of the reserve system is accomplished from outside the cable spreading room. In this event the reserve bank would have actuated as designed, if activated by the fire brigade with the original actuation signal still applied to the Halon system. The check valves in the reserve bank were inspected and found to be installed correctly.

Concurrent with these actions, if the fire were considered severe enough, based on smoke or incorrect operation of control room equipment, a decision could be made to evacuate the control room

and commence proceduralized plant shutdown from the alternate shutdown panel. These actions are entirely independent of and do not rely upon cable spreading room suppression system operation.

Note that the potential for a fire being initiated in the cable spreading room is considered quite low. Transient combustibles must be monitored at all times in this area as required by plant procedures. Procedures require permits for transient chemical combustibles in the cable spreading room; above 1 gallon being strictly monitored and maintained in approved containers. Likewise, flame retardant wood in excess of 100 pounds in this area would require a permit. Review of fire protection records indicates that no permits have been issued for the cable spreading room. Accordingly, any transient combustible would be less than 1 gallon and would be under strict control.

Probabilistic Safety Assessment

The loss of the use of one of two bottles of Halon from the main bank would result in partial loss of fire suppression capability. However, the remaining bottle can be expected to prevent the propagation of a fire to some extent. The calculated Core Damage Frequency (CDF) for the cable spreading room is 2.8E-6 per reactor year. This analysis, using the FIVE methodology and equations, assumed the following:

o The fire ignition frequency for cable spreading room = 7.8E-3/Yr
o The failure probability of Auxiliary Shutdown Panel (ASP) failure = 0.1
o The failure probability of automatic Halon suppression = 0.05
o The failure probability of manual suppression = 1

For the circumstances which occurred, given that one bottle of the cable spreading room Halon system is out of service, the failure of Halon suppression would be increased to 0.5. A failure probability of 0.5 is reasonable compared to a failure probability of 1.0, since the main Halon system is partially operable and is expected to prevent the fire from propagating compared to the case where there is a total loss of the Halon system. This makes the possibility of taking manual action to initiate suppression more likely, thus a manual suppression failure probability of 0.2 is considered in this case. Keeping the ignition frequency and failure of the ASP failure as 7.8E-3/Yr and 0.1 respectively, would result in the CDF of 5.61E-6 per reactor year. The increased risk associated with this event is concluded to be small.

Conclusions

The following general conclusions can be made regarding this incorrectly installed configuration concern:

1. While the cable spreading room Halon system was degraded, it maintained some level of functionality in

that it would have extinguished flames for certain types of chemicals. The degraded installation would inhibit the propagation of fires for most chemical substances (i.e., may "stall" the fire). This would provide additional time for the plant to respond and fight the fire.

2. The reserve system was fully functional. In the event of a significant fire, the fire brigade leader would have the option of discharging the reserve system, and thus extinguishing any fires.

3. The likelihood of a cable spreading room fire is low, and is shown above to be not risk significant.

V. CORRECTIVE ACTIONS

1. Control power cabinet 2BD has been inspected for other water damage and appropriate testing has been completed to assure the operability of the control cards in the power cabinet. Other cabinets in the area have been inspected to assure no other water intrusion has occurred.

2. The drain design of the air conditioner evaporator drip pan in the cable spreading room has been evaluated for flow capability. The size, routing and material used for the drain will be modified, if appropriate, to reduce the probability of an overflow. Other air conditioning evaporator drip pan drainage systems have been inspected for proper operation. Adequate drainage was found.

3. The anchor pads in the cable spreading room in the area that puddled during the event have been caulked to prevent a water path to the bolt holes beneath.

4. The conduit penetration through the top of control power cabinet 2BD has also been caulked.

5. Proper installation of all check valves in the Turkey Point Halon automatic suppression systems has been visually verified.

6. Appropriate fire watches were posted while the Halon system was in a degraded configuration.

7. The Halon suppression system for the cable spreading room was returned to full service on October 24, 1995.

8. Electrical Maintenance Surveillance Procedure 0-SME-091.1, "Fire and Smoke Detection System Semi-Annual Test," and Operating Procedure O-OP-016.5, "Halon Suppression System," have been revised to provide for a different removal-from-service technique to reduce the probability of spurious actuation of the automatic suppression system.

VI. ADDITIONAL INFORMATION

EIIS Codes are shown in the format EIIS SYSTEM: IEEE component function identifier, second component function identifier (if appropriate)!.

ATTACHMENT TO 9511210125 PAGE 1 OF 1

FPL Nov 09 1995
L-95-283
10 CFR Section 50.73

U. S. Nuclear Regulatory Commission
Attn: Document Control Desk
Washington, D. C. 20555

Gentlemen:

Re: Turkey Point Unit 3
Docket No. 50-250
Reportable Event: 95-007-00
Manual Reactor Trip Following Drop of Four Control Rods

The attached Licensee Event Report, 250/95-007-00, is being provided in accordance with 10 CFR 50.73(a)(2)(iv).

If there are any questions, please contact us.

Very truly yours,

T. F. Plunkett
Vice President
Turkey Point Plant

JEK

attachment

cc: Stewart D. Ebneter, Regional Administrator, Region II,
USNRC
Thomas P. Johnson, Senior Resident Inspector, USNRC,
Turkey Point Plant

an FPL Group company

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